3.7.10 WASTE MANAGEMENT

This section outlines the major environmental regulatory structure and ongoing waste management activities for SRS. A more detailed discussion of the ongoing waste management operations is provided in Section E.2.6. Table 3.7.10–1 presents a summary of waste management activities at SRS for 1993.

The Department is working with Federal and State regulatory authorities to address compliance and cleanup obligations arising from its past operations at SRS. The DOE is engaged in several activities to bring its operations into full regulatory compliance. These activities are set forth in negotiated agreements that contain schedules for achieving compliance with applicable requirements, and financial penalties for nonachievement of agreed-upon milestones.

The EPA has placed SRS on the NPL and has identified approximately 150 potential operable units. In accordance with CERCLA, DOE entered into an FFCA with the EPA and the State of South Carolina, effective January 15, 1993, to coordinate cleanup activities at SRS under one comprehensive strategy. The FFCA combines the RCRA Facility Investigation Program Plan (under RCRA) with a CERCLA cleanup program entitled the RCRA Facility Investigation/Remedial Investigation Program Plan.

The Savannah River Site has an aggressive waste minimization program in progress to vastly improve the operation of existing and planned liquid and solid waste generating, treatment, and storage facilities. A disciplined approach to these activities is being developed based on technology and experience from the commercial nuclear industry. This approach already has significantly reduced the generation of TRU waste (48 percent), LLW (13 percent), mixed waste (96 percent), and hazardous waste (58 percent) (DOE 1993e:I-18). SRS generates and manages spent nuclear fuel and the following waste categories: high-level, TRU, low-level, mixed, hazardous, and nonhazardous. A discussion of the waste management operations associated with each of these categories follows.

Spent Nuclear Fuel. With the shutdown of the production reactors at SRS, no new spent nuclear fuel is expected to be generated from existing SRS operations. Future receipt and management of spent nuclear fuel at SRS will be made in accordance with the ROD published in the *Federal Register* (60 FR 28680) on June 1, 1995, and amended on March 8, 1996 (61 FR 9441) for the *Department of Energy Programmatic Spent Nuclear Fuel Management and Idaho National Engineering Laboratory Environmental Restoration and Waste Management Programs Final Environmental Impact Statement* (DOE/EIS-0203-F), and the ROD (61 FR 25092) for the EIS on the *Proposed Policy for the Acceptance of U.S. Origin Foreign Research Reactor Spent Nuclear Fuel* (DOE/EIS-0218F).

High-Level Waste. Liquid HLW at SRS is made up of many waste streams generated during the recovery and purification of TRU products and unburned fissile material from spent reactor fuel elements. These wastes are separated by waste form, radionuclide, and heat content before their transfer to underground storage tanks in the F- and H-Area tank farms. Processes used routinely to treat liquid HLW are separation, evaporation, and ion exchange. Evaporation produces a Cs-contaminated condensate. Cesium is removed from the condensate resulting in a LLW stream that is treated in the ETF. The remaining HLW stream salts are precipitated, and some can be decontaminated. The decontaminated salt solution is sent with residues from the ETF to the Defense Waste Processing Z-Area Saltstone Facility where it is mixed with a blend of cement, flyash, and blast furnace slag to form grout. The grout is pumped into disposal vaults where it hardens for permanent disposal as solid LLW. The remaining high-level salt and sludge is permanently immobilized as a glass solid cast in stainless steel containers at the DWPF Vitrification Plant. The stainless-steel containers are decontaminated to DOT standards, welded closed, and temporarily stored onsite for eventual transport to and disposal in a permanent Federal repository. Future HLW generation could result from the processing and stabilization of spent fuel for long-term storage as a result of 60 FR 28680, and from remediation or materials recovery activities performed in the F- and H-Canyons.

Table 3.7.10–1. Spent Nuclear Fuel and Waste Management Activities at Savannah River Site

Category	1993 Generation (m^3)	Treatment Method	Treatment Capacity (m^3/yr)	Storage Method	Storage Capacity (m^3)	Disposal Method	Disposal Capacity (m^3)
Spent Nuclear Fuel	None	Stabilization[a]	None[a]	Pools	Sized to current inventory	None–High-Level Waste Program in the future	NA
High-Level							
Liquid	1,561	Settle,separate, evaporate	53,700[b]	F- & H- Area Tank Farm	133,000[c]	NA[d]	NA
Solid	None	Vitrification[e]	None	Air Cooled Shielded Facility	2,286 canisters[f]	None–High-Level Waste Program in the future	NA
Transuranic							
Liquid	None	NA	NA	NA	NA	NA	NA
Solid	391	None	None	Pads, buildings	14,600[g]	None–WIPP or alternate facility in the future	None
Low-Level							
Liquid	None	Absorption, evaporation, filtration, neutralization, saltstone	503,000[h]	Ponds, tanks-awaiting processing	NA	NA	NA
Solid	14,100	Compaction	3,980[i]	NA	NA	Burial vaults and trenches	2,578,000[j]
Mixed Low-Level							
Liquid	115	Stabilization, adsorption, neutralization, precipitation, filtration, ion exchange, evaporation	511,000[k]	RCRA permit Bldgs. E, 600, 700, M-Area Liquid Effluent Treatment Facility	11,500[l]	None	None
Solid	18	None	NA	RCRA permit Bldg. 600	1,990[m]	None	None
Hazardous							
Liquid	None	None	None	DOT containers	Included in solid	Offsite	NA
Solid	74[n]	None	None	DOT containers	2,618[o]	Offsite	NA

Table 3.7.10–1. Spent Nuclear Fuel and Waste Management Activities at Savannah River Site—Continued

Category	1993 Generation (m^3)	Treatment Method	Treatment Capacity (m^3/yr)	Storage Method	Storage Capacity (m^3)	Disposal Method	Disposal Capacity (m^3)
Nonhazardous (Sanitary)							
Liquid	700,000[p]	Filter, settle, strip	1,451,000[q]	Flowing ponds	NA	Permitted discharge	Varies by each permitted outfall
Solid	6,670	Compaction	Expandable, as required	NA	NA	Landfill (onsite and offsite)	Expandable, as required
Nonhazardous (Other)							
Liquid	Included in sanitary	Included in sanitary	Included in sanitary	Included in sanitary	NA	Included in sanitary	Included in sanitary
Solid	Included in sanitary	Included in sanitary	Included in sanitary	NA	NA	Included in sanitary	Included in sanitary

[a] Some fuel will be processed in the F- and H-Canyons in accordance with the Final Environmental Impact Statement, *Interim Management of Nuclear Materials*.

[b] SRTC ion exchange, evaporators.

[c] F- and H-Area Tank Farms.

[d] Treatment removes the high level constituents (salt and sludge) from the liquids. The salt and sludge are vitrified.

[e] DWPF started operation in 1995.

[f] Defense Waste Processing Facility.

[g] TRU storage pads.

[h] Includes F- and H-Area Effluent Treatment Facility.

[i] Onsite compactors.

[j] Saltstone vaults, E-Area vaults, slit trenches.

[k] Includes F- and H-Area Effluent Treatment Facility, M-Area Effluent Treatment Facility, and Savannah River Technology Center Ion-exchange Treatment.

[l] Hazardous Waste Storage Facility, mixed waste storage buildings, Process Waste Interim Treatment, DWPF organic waste storage tank, burial ground storage tank, SRTC mixed waste storage.

[m] Hazardous Waste Storage Facility, mixed waste storage buildings.

[n] SRS generated 64.93 t of RCRA-regulated and 8.90 t TSCA-regulated hazardous wastes; thus, the sum is approximately 74 t. Assuming a density of 1,000 kg/m^3, a volume of 74 m^3 was calculated.

[o] Pads and buildings in B-, M-, and N-Areas.

[p] 1991 data.

[q] Centralized Sanitary Wastewater Treatment Facility.

Note: NA=not applicable.

Source: DOE 1995kk; SR DOE 1993c; SR DOE 1994b; SR DOE 1994c; SR DOE 1995b; SR DOE 1995c; SR MMES 1993a; SRS 1995a:2; WSRC 1995a.

Transuranic Waste. Under the FFCA on RCRA, LDRs signed by EPA and DOE on March 13, 1991, SRS is required to prepare TRU waste for shipment. SRS will begin discussions with the South Carolina Department of Health and Environmental Control on alternative treatment options in January 1998 if the Secretary of Energy does not decide to operate WIPP by that time. If a delayed opening date for WIPP is determined, DOE will propose modifications to the *SRS Site Treatment Plan* for approval by the State of South Carolina. Status of the WIPP readiness schedule will be included in the updates. Certified TRU waste is stored on TRU waste storage pads until it can be shipped to an approved TRU waste disposal facility. Should additional treatment be necessary for disposal, SRS would develop the appropriate treatment capability. All TRU waste currently generated is stored in containers on aboveground pads.

The Experimental TRU Waste Assay and Certification Facility began operations in 1986 to certify newly generated TRU waste. It since has been shut down. A new TRU waste characterization and certification facility is planned, and would provide extensive containerized waste processing certification capabilities. The facility is needed to prepare TRU waste for treatment and to certify TRU waste for disposal at WIPP. Drums that can be certified for shipment to WIPP are placed in interim storage on concrete pads in E-Area. Buried and stored waste containing concentrations of TRU nuclides between 10 and 100 nanocuries (nCi)/g (referred to as alpha-contaminated LLW or alpha waste) is managed like TRU waste because its physical and chemical properties are similar, and because similar procedures will be used to determine its final disposition. Because all of the TRU waste placed on the aboveground pads prior to January 1990 is suspected of having hazardous constituents, a RCRA Part B permit application has been submitted for the TRU waste storage pads and the Experimental TRU Waste Assay Certification Facility. The waste is currently being stored under RCRA interim status.

Low-Level Waste. The bulk of liquid LLW is aqueous process waste, including effluent cooling water, decontaminated salt solutions, purge water, water from storage basins for irradiated reactor fuel or target elements, distillate from the evaporation of process waste streams, and surface water runoff from areas where there is a potential for radioactive contamination. Liquids are processed to remove and solidify the radioactive constituents and to release the balance of the liquids to permitted discharge points within standards established by the regulatory permit. Solid LLW includes operating plant and laboratory waste, contaminated equipment, reactor and reactor-fuel hardware, spent lithium-aluminum targets, and spent deionizer resin from reactor coolant treatment. Solid LLW is separated by radiation levels into low and intermediate categories. Solid LLW that radiates less than 200 mrem/hr at 5 cm (1.97 in) from the unshielded container is considered low-activity waste. If it radiates greater than 200 mrem/hr at 5 cm (1.97 in), it is considered intermediate-activity waste. Intermediate-activity tritium waste is intermediate-activity waste with greater than 10 Ci of tritium per container. The disposal mode for solid LLW is disposal in earthen trenches and concrete vaults. Saltstone generated in the solidification of decontaminated salts extracted from HLW is disposed of as LLW in separate vaults. Saltstone is the highest volume of solid LLW disposed of at SRS. Disposal facilities are projected to meet solid LLW storage/requirements and to include LLW from offsite DOE facilities for the next 20 years.

Mixed Low-Level Waste. The FFCA signed by EPA and DOE on March 13, 1991, addresses SRS compliance with RCRA LDRs pertaining to past, ongoing, and future generation of mixed LLW (mostly solvents, dioxin, and California list wastes contaminated with tritium). SRS is allowed to continue to operate, generate, and store mixed wastes subject to LDRs; in return, SRS will report to EPA the characterization of all solid waste streams disposed of in land disposal units at SRS and has submitted its waste minimization plan to EPA for review. Schedules for measures to provide compliance through construction of the Consolidated Incineration Facility and the Hazardous Waste and Mixed Waste Storage Facility are included in the FFCA.

The Consolidated Incineration Facility will treat mixed LLW and hazardous waste. The Hazardous Waste and Mixed Waste Disposal Vaults are scheduled to be available in 2002. Mixed waste is currently placed in interim storage in the E-Area Solid Waste Disposal Facility and in two buildings in G-Area. These RCRA-permitted facilities will be used until completion of the Consolidated Incineration Facility and the Hazardous Waste and Mixed Waste Storage Facility. The FFCA requires DOE facilities storing mixed waste to develop site-specific

treatment plans and to submit the plans for approval. The FFCA formed the basis for the *SRS Proposed Site Treatment Plan.*

Hazardous Waste. Lead, mercury, cadmium, 1,1,1-trichloroethane, leaded oil, trichlorotrifluoroethane, benzene, and paint solvents are typical hazardous wastes generated at SRS. All hazardous wastes are stored onsite in DOT-approved containers in RCRA-permitted facilities in three RCRA-permitted hazardous waste storage buildings and on three interim status storage pads in the B- and N-Areas. Most of the waste is shipped offsite to commercial RCRA-permitted treatment and disposal facilities using DOT-certified transporters. Eight to nine percent of the hazardous waste (organic liquids, sludge and debris) will be incinerated in the Consolidated Incineration Facility. Hazardous chemicals are stripped from aqueous liquids collected during groundwater monitoring in the M-Area Stripper, and the treated wastewater is discharged in accordance with discharge limits of appropriate NPDES permits.

Nonhazardous Waste. In 1994, the centralization and upgrading of the sanitary wastewater collection and treatment systems at Savannah River were completed. The program included the replacement of 14 aging treatment facilities (out of 20) scattered across the site with a new 3,975 m^3/day (1.05 million gal/day) central treatment facility and connecting them with a new 29-km (18-mi) primary sanitary collection system. The collection system intercepts wastewater at points prior to discharge into old sanitary wastewater treatment facilities. The new central treatment facility treats sanitary wastewater by the extended aeration activated sludge process utilizing the oxidation ditch method. The treatment facility separates the wastewater into two forms, clarified effluent and sludge. The liquid effluent is further treated by non-chemical methods of ultraviolet light disinfection to meet NPDES discharge limitations. The sludge goes through a volume reduction process to reduce pathogen levels to meet proposed land application criteria (40 CFR 503). The remaining existing sanitary wastewater treatment facilities are being upgraded as necessary to meet demands by replacing existing chlorination treatment systems with non-chemical ultraviolet light disinfection systems to meet NPDES limitations. SRS-generated municipal solid waste is sent to a permitted offsite disposal facility. DOE is evaluating a proposal to participate in an interagency effort to establish a regional solid waste management center at SRS (DOE/EA-0989, DOE/EA-1079).